



Modeling effects of urban heat island mitigation strategies on heat-related morbidity: A case study for Phoenix, Arizona, USA

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Abstract:

A zero-dimensional energy balance model was previously developed to serve as a user-friendly mitigation tool for practitioners seeking to study the urban heat island (UHI) effect. Accordingly, this established model is applied here to show the relative effects of four common mitigation strategies: increasing the overall (1) emissivity, (2) percentage of vegetated area, (3) thermal conductivity, and (4) albedo of the urban environment in a series of percentage increases by 5, 10, 15, and 20% from baseline values. In addition to modeling mitigation strategies, we present how the model can be utilized to evaluate human health vulnerability from excessive heat-related events, based on heat-related emergency service data from 2002 to 2006. The 24-h average heat index is shown to have the greatest correlation to heat-related emergency calls in the Phoenix (Arizona, USA) metropolitan region. The four modeled UHI mitigation strategies, taken in combination, would lead to a 48% reduction in annual heat-related emergency service calls, where increasing the albedo is the single most effective UHI mitigation strategy. © ISB 2009.

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Resource Description

Climate Scenario :

specification of climate scenario (set of assumptions about future states related to climate)

Other Climate Scenario

Other Climate Scenario: author defined scenarios

Exposure :

weather or climate related pathway by which climate change affects health

Meteorological Factors, Temperature, Other Exposure

Temperature: Extreme Heat

Other Exposure: heat index

Geographic Feature:

resource focuses on specific type of geography

Desert, Urban

Climate Change and Human Health Literature Portal

Geographic Location:

resource focuses on specific location

United States

Health Co-Benefit/Co-Harm (Adaption/Mitigation):

specification of beneficial or harmful impacts to health resulting from efforts to reduce or cope with greenhouse gases

A focus of content

Health Impact:

specification of health effect or disease related to climate change exposure

Injury, Other Health Impact

Other Health Impact: heat related morbidity

Mitigation/Adaptation:

mitigation or adaptation strategy is a focus of resource

Mitigation

Model/Methodology:

type of model used or methodology development is a focus of resource

Outcome Change Prediction

Resource Type:

format or standard characteristic of resource

Research Article

Timescale:

time period studied

Time Scale Unspecified